Response to ragweed allergen provocation in the Red Maple Trials Allergen Challenge Theatre™

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Abstract

Rationale: Allergen challenge chambers expose allergen-sensitive subjects to a predetermined concentration of allergen in a closed, controlled environment and provide a mechanism to induce clinical symptoms and measure the effect of medication.
Methods: We evaluated the response of ragweed-allergic subjects to two ragweed challenges in the Red Maple Trials Allergen Challenge Theatre. A provincial Ethics Board approved the study. After signing informed consent, patients with a history of ragweed allergy, not on allergy medications and with positive skin prick tests (> 3 mm) to ragweed antigen were exposed to ragweed pollen in a 3-hour priming session. Total nasal (TNSS), ocular and rhinoconjunctivitis symptom scores (TRSS) were recorded at baseline and every 30 minutes during the challenge. Those with peak TNSS ≥ 5 were then selected for two further 4-hour challenges..
Results: 48/76 subjects evaluated underwent the priming challenge. Thirty-three subjects achieving a peak TNSS ≥5 underwent two subsequent 4-hour challenges. Baseline TNSS (mean± SD) was 1.70 ±1.34 and 2.53±1.76 in challenges 1 and 2, respectively. Baseline TRSS values were 2.00± 1.66 and 3.60±2.69 respectively. Symptom scores reached a plateau by 120 minutes and remained steady for the remainder of the 240-minute exposure. Plateau TNSS was 6.28±0.20 for Challenge 1 and 6.19±0.24 for Challenge 2. Similarly, plateau TRSS values were 9.10±0.20 and 9.11± 0.33, respectively.
Conclusions: The Red Maple Trials allergen exposure theatre demonstrated the capacity to induce symptoms of appropriate intensity upon ragweed allergen challenge. The chamber with a 100-person capacity has the ability to evaluate large test groups at one time.

Introduction

Allergen challenge chambers expose allergen-sensitive subjects to a predetermined concentration of allergen in a closed, controlled environment and provide a mechanism to induce clinical symptoms and measure the effect of medication.

The purpose of this study was to evaluate the Red Maple Trials ACT (Allergen Challenge Theatre) for controlled ragweed pollen inhalation studies in subjects with seasonal allergic rhinitis by examining the response on two allergen challenge days.

Objectives

The objectives of the study were to assess:

- Rhinitis symptom scores in primed ragweed-allergic subjects during 4-hour grass challenges carried out on two separate days in the Red Maple Trials ACT.
- Whether there was a significant difference in symptom scores between the two challenges
- TNSS, TOSS and TRSS at individual time points on the two exposure days
- Adverse events during allergen exposure

Methods

This was a 23-day single-group validation study. The study consisted of 4-5 visits to the clinic and one follow-up telephone call. The study population consisted of a sample of 33 healthy male and female adults 18 to 65 years of age with a clinical diagnosis of seasonal allergic rhinitis, positive skin prick tests to grass pollen and nasal symptoms during the grass pollen season in the previous 2 years. They were required to have normal lung function at the screening visit (FEV_1 ≥80% of the predicted normal value).

Exclusion criteria included asthma with the exception of mild intermittent asthma treated by short-acting β-agonists only, structural nasal defects or nasal polyps, an infection of the upper airways within 2 weeks prior to the screening visit, pregnancy, a history of anaphylactic reactions and allergen desensitization within the previous 2 years.

Seventy-six subjects were screened and 48 eligible subjects underwent a priming challenge. Each subject gave written informed consent before any study evaluations were performed. Thirty-three subjects achieving a peak TNSS ≥5 were selected for two subsequent 4-hour challenges with ragweed pollen (*Ambrosia artemisiiflolia*) in the allergen challenge theatre (ACT). Three subjects with protracted rhinitis symptoms were not included in the second challenge leaving an evaluable population of 30 subjects.

Total nasal (TNSS), ocular (TOSS) and respiratory symptom scores (TRSS) were recorded at baseline and every 30 minutes during each challenge.

Adverse events were collected at each study visit.

Results

The mean pollen concentration was 3929 grains/m^3 for Challenge 1 and 4099 grains/m^3 for Challenge 2. TNSS (Figure 1), TOSS (Figure 2) and TRSS (Figure 3) scores were comparable on the two challenge days , reaching a plateau at about 120 minutes. The mean priming challenge values for the 30 subjects were also included in the graphs, for comparison.
The mean symptom scores for the plateau (120 to 240 minutes) were calculated for each subject. The group means are shown in Table 1. There was no statistically significant differences for either TNSS, TOSS or TRSS.
Eight adverse events were experienced by 7 subjects, as shown in Table 2.
The case of severe diaphoresis and one case of epistaxis were considered related to the ragweed challenge.

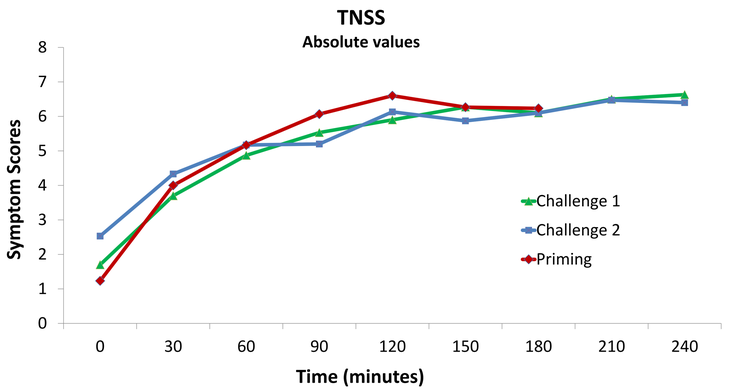

Figure 1: TNSS scores were comparable during the ragweed challenges

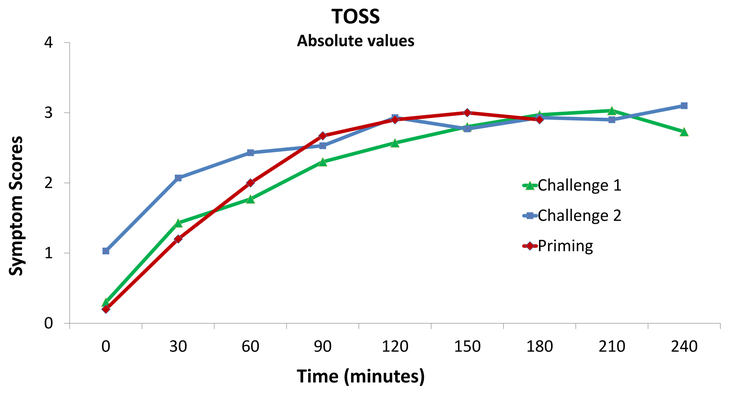

Figure 2: TOSS scores during the ragweed challenges

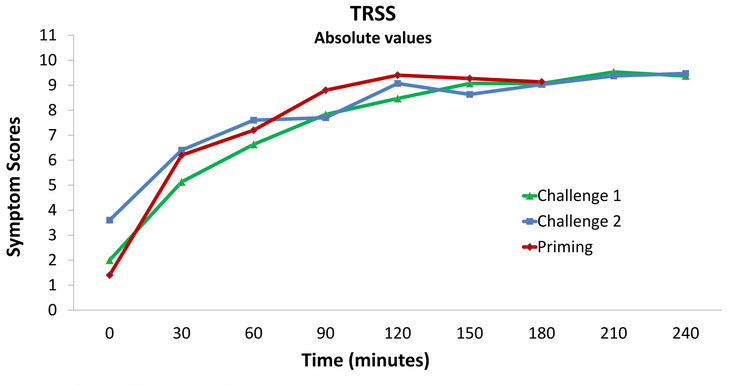

Figure 3: TRSS scores during the ragweed challenges

Mean Symptom Scores

	Challenge 1	Challenge 2	P value
TNSS mean (SD)	6.28 (1.49)	6.19 (2.14)	0.74
TOSS mean (SD)	2.82 (1.40)	2.93 (1.82)	0.59
TRSS mean (SD)	9.09 (2.27)	9.11 (3.26)	0.93

Table 1: Group mean plateau (120-240 min) values

Adverse Events
3 epistaxis: 3 mild, 0 moderate, 0 severe
2 diaphoresis: 1 mild, 1 moderate, 0 severe
1 chest congestion
1 vaginitis
1 epigastric pain
Total: 8

Table 2: Adverse Events

Conclusion

This study demonstrates that ragweed pollen challenge in primed subjects in the Red Maple Trials ACT generates consistent symptoms on two different days. Adverse events were few, mostly mild and mostly not suspected to be related to the challenge.

References

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